



Cracking the Code

By: Tamar Burris

Grade Level: 2

Time Allotment: 1.5 hrs

Overview: In this lesson, students will explore patterns with colors, shapes, and numbers. Students will first complete a fun quiz on patterns with shapes, numbers, and letters. Through watching portions of “Cyberchase #107: The Poddleville Case” and discussing what makes a pattern, students will gain an understanding of what makes a pattern. They will then use sentence strips and crayons to create their own “secret pattern” codes and get a chance to see if they can crack their classmates’ secret codes. Finally, students will practice their knowledge of patterns with an online patterning game from the “Cyberchase” Web site.

Subject Matter: Math

Learning Objectives:

- Students will share their definitions of what makes a pattern in a class discussion of the book, “I See Patterns”
- Students will show their understanding of what makes a pattern by creating their own patterns with shapes, colors and/or number
- Students will demonstrate a working knowledge of patterns by figuring out the patterns created by their classmates

Standards: Montana Mathematics Standard 7.1: *Students demonstrate understanding of and an ability to use patterns, relations and functions. Recognize, describe, extend, and create a variety of patterns.* (Source: <http://www.opi.state.mt.us>)

Media Components: Cyberchase #107: The Poddleville Case (<http://pbskids.org/cyberchase/>)-- This is the URL for Cyberchase-related games on the official PBS Kids site for the “Cyberchase” show.

Materials:

- Sentence strips, at least 2 per student
- Crayons
- Pencils, 1 per student

- 1 copy “I See Patterns,” by Linda Benton, Creative Teaching Press, 1995
- Overhead projector and white board or chart paper
- Marker
- Classroom Patterns worksheets, 1 copy per student
- POP Quiz! Worksheets, 1 per student and 1 overhead copy

Teacher Prep:

Cue videotape to play from where you see an image of the Motherboard on a blue, square tree saying “There is trouble in Poddleville.”

Photocopy “Classroom Patterns” worksheet, 1 per student

Photocopy “POP Quiz!” worksheet, 1 per student and 1 overhead copy

Arrange overhead projector so students can see it, have it plugged in and ready to go.

Obtain pattern-making materials (crayons, sentence strips, etc.)

Bookmark (<http://pbskids.org/cyberchase/>)

Introductory Activity:

1. Pass out copies of the “POP Quiz!” Worksheet
2. Do the quiz as a whole class activity, ask students to raise their hands and tell you the answers to the quiz. Using the overhead copy circle, write, or draw in the given answer.
3. Ask students how they came up with their answer. Ask whether or not other students agree or disagree with the answer.

Learning Activities:

1. In a class discussion, talk about the concept of patterns. Ask students such questions as, “Do patterns repeat shapes or numbers?” “Can you have a pattern without repeating things?” Ask students for a definition for “pattern” and write their definitions on chart paper, the board, or overhead projector, whichever you are using.
2. Read “I See Patterns” aloud. Pause on pictures, allowing students to see each pattern. Discuss the patterns with your students; ask them questions about what they see. Ask them how they know what they see is a pattern. Point with your finger to certain repetitions of color or shapes to help them visualize the patterns.
3. Revisit the class definitions of “pattern” and ask students to tell you if what they said before is still true or if they have anything to add to their definitions. Create a unified class definition of pattern. Make sure the definition somehow states that patterns are repeating sequences or sequences that change in an orderly fashion.
4. Introduce the Cyberchase episode of “The Poddleville Case,” be sure to tell your students to pay close attention to the number patterns and shape patterns they see in the show. Set focus for media interaction: Tell students they will need to tell you what Hacker is after and why and what the secret code is that opens Poddleville Park. (Answers: Hacker wants Poddleville’s cyberpower so that he can destroy their world. The secret code is triangle, square, circle, circle, triangle, square, circle, circle, triangle, square, circle, circle...) Start playing tape from where you see an image of the Motherboard on a blue, square tree saying “There is trouble in Poddleville.”

5. Pause tape with Jackie (one of the kids) looking through the jail cell bars and saying, "We've got to bust of here and save Poddleville..." Ask for students to make predictions based on what they have seen. Will the kids be able to save Poddleville? Will they find the pattern?
6. Set focus for media interaction: Have students watch for the reason the podling knows the kids are innocent. (Answer: The kids were holding a number 2 podling, the missing podlings were numbers 3 and 5). Resume the tape and stop again with the kids standing around the cyberboard and looking at the pattern and a voice cue of "Ah-ha, There it is!" Draw the shapes and write the corresponding numbers of pods Hacker has stolen on the board (SQUARE- 1, 3, 5, 7, 9, 11 TRIANGLE- 3, 5, 7, 9, 11 CIRCLE- 1, 3, 5, 7, 9, 11). Ask students to tell you patterns they see and see if any students can tell you what pod Hacker is still missing. (The missing pod is a TRIANGLE 1, an example of patterns the students may see are that all the numbers are odd)
7. Set focus for media interaction: At the end of this section, students must tell you which were the first three pods (numbers and shapes) of the pattern. (Answer: Square 11, Circle 9, Triangle 7). Resume the tape with an image of Jackie and the podling running with pods in their arms and Jackie saying "We've got to solve the pattern before they do..." Pause tape again with the visual cue of the computer with the nearly finished pod pattern displayed and Jackie's voice saying "11-9-7-5." Point out the pattern showing on the paused screen and say "We now know the pattern is decreasing odd numbers. So, what should the next number be?" (Answer: 3).
8. Set focus for media interaction: Have students tell you what the double pattern is. (Answer: numbers and shapes) Resume playing the tape from where you paused. Stop tape with the visual image of the powerboard lighting up with a green light, a bell ringing, and Jackie saying, "We're in."
9. Discuss the episode. Ask the students to tell you about the patterns they noticed, be sure to talk about the double code.
10. Tell your students they are going to be making their own secret patterns on sentence strips.
11. Model drawing a simple repeating pattern with three different colored shapes on the board. For example, draw two repetitions of a pattern containing a triangle, square, and circle. At the end of the pattern add three blank lines and ask for a volunteer to come up and fill in the rest of the pattern.
12. Repeat a few different times, using different shapes or with more advanced students using numbers, for example in a pattern that repeats blue square 4, red triangle 5, orange star 6, blue square 4, red triangle 5, orange star 6, until you are sure students understand the concept.
13. Give each student two sentence strips and tell them that on one sentence strip they should draw a repeating pattern all the way across the strip, using at least three different shapes or numbers. Tell them to check their pattern with you before working on the second sentence strip. On the second strip they will be drawing only two repetitions of the pattern and leaving the rest blank.
14. Allow students to work on their patterns. Once they finish their first strip and have their pattern checked, give them some time to draw two repetitions of their pattern on the second strip.

15. When students finish making their patterns pair them with another student and have them exchange their unfinished pattern strips with the other student. Give them 10-15 minutes to solve each other's secret pattern.

Culminating Activity:

1. Tell students to look around the classroom and raise their hands if they see any patterns in the room, on their desk, etc.
2. Hand out the Classroom Patterns worksheet and boxes of crayons. Give students 20-25 minutes to walk around the classroom and copy any patterns that they see.
3. Share the classroom patterns they've discovered in a whole class discussion. As they share the patterns they've found, ask students such questions as "What is the pattern here?" "Is this a pattern? How do we know?" "Do you see anything repeating itself in this pattern?" "Is there more than one pattern here?"
4. Once students have finished discussing their classroom patterns, divide them into groups of three and have each group log on to <http://pbskids.org/cyberchase/>. Once there, instruct the students to click on either the "Pattern Player" or "Pattern Quest" game and practice their pattern-making skills by playing the "Cyberchase" patterns games. Set focus for media interaction: Ask students to tell you if using sound makes a pattern easier or harder to detect. Ask them if the secret patterns on the "Pattern Quest" game were easier or harder than the patterns their classmates created.

Cross-curricular Extensions:

Math

- Display some or all of the unfinished secret patterns on a visible wall or laminate them and keep them with your class games and puzzles so that students can practice "cracking" them in their free time

Social Studies

- Study the American folk tradition of quilt design. Have students design patterns for quilt squares

Science

- Study patterns found in nature

Art

- Study M.C. Escher, do an art project based on Escher's style of patterning

Community Connections:

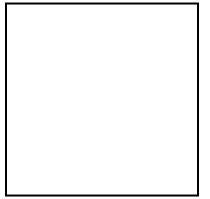
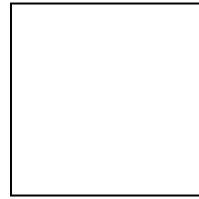
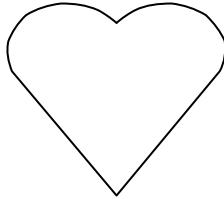
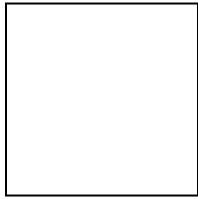
- Invite an architect to speak in the classroom about patterns used in design
- Take a field trip to an art museum to explore patterns used by artists

POP Quiz!

1) What number comes next?

1, 2, 3, 4, 1, 2, 3, 4, 1, 2, _____

2) What is the missing shape?



3) Which letters are out of place?

W, M, T, W, M, T, W, M, M, T

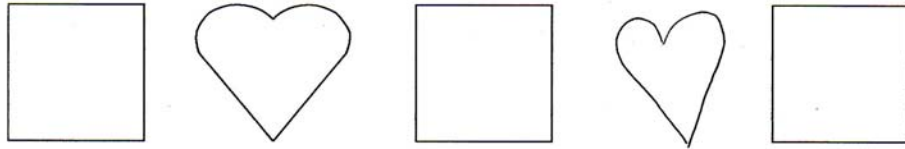
TEACHER
COPY

POP Quiz!

1) What number comes next?

1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3

2) What is the missing shape?



3) Which letters are out of place?

W, M, T, W, M, T, W, M, M, T